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Progress with an Implicit Drift-Lorentz mover

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It is often desirable to follow charged-particle trajectories through regions where the particles are strongly magnetized as well as regions with little or no magnetic field, with timesteps large compared to the smallest cyclotron period. To address this need we developed the drift-Lorentz particle mover which interpolates between full particle dynamics and drift kinetics in such a way as to preserve proper particle drifts, motion along the magnetic field, and gyroradius in the large-B limit, while smoothly matching on to full-particle dynamics at small B. In order to be able to apply the mover to high-density problems (where the plasma frequency is comparable to or exceeds the cyclotron frequency) we have formulated and implemented a fully implicit (electrostatic) version. We describe this implementation, as well as successful tests on a magnetized Buneman instability. We also discuss the status of combining this mover with collisions, as well as electromagnetic extensions.